United States Department of Agriculture
Grain Inspection, Packers and Stockyards Administration
Federal Grain Inspection Service

Program Notice FGIS-PN-99-19 10-18-99

ADJUSTMENT FACTORS FOR OLEIC TYPE SUNFLOWER SEED

1. **PURPOSE**

This notice announces the replacement of the standard adjustment factor for high-oleic type sunflower seed and establishes a standard adjustment table for determining the oil content of mid-oleic type sunflower seed using the continuous wave wide-line Nuclear Magnetic Resonance (NMR) method. It also eliminates the refractive index test as an official method for determining the type of sunflower seed.

2. **BACKGROUND**

The present NMR oil calibration was developed on the basis of linoleic-type sunflower seed. To accurately predict the output oil volume of high-oleic-type seeds, Federal Grain Inspection Service (FGIS) has applied an adjustment factor of 0.97 to NMR sample results.

Since the institution of the 0.97 adjustment factor, seed companies have increased the oleic (monounsaturated) fatty acid content of high-oleic-type specialty seeds. While this enhancement of seed quality increases the amount of Apremium@ oil characteristics, it has a direct impact on the standard adjustment factor used to calculate oil volume. Increased oleic acid content causes the NMR calibration to over-predict the true output oil volume.

Citing this trend in elevated levels of oleic content, and the proprietary nature of high-oleic-type seeds, FGIS has decided to replace the **standard adjustment factor for high-oleic-type seeds with "customed figured" adjustment tables**. Tables have been created for Mycogen and Pioneer brand high-oleic-type seed. Seed companies may request new or updated adjustment tables for high-oleic-type sunflower seeds produced in the United States (U. S.).

In addition to the high-oleic-type seed, another seed type with elevated oleic content, a mid-oleic-type, has been developed. The new hybrids, collectively called NuSun, are low in saturated fats, produce oil that is several times higher in oleic acid than traditional sunflower oil, and hold up longer in frying vats. These NuSun qualities are particularly attractive to the U.S. snack food industry.

In the fall of 1998, FGIS and the National Sunflower Association coordinated efforts to collect 100 mid-oleic seed samples representing various sunflower growing regions. Industry labs analyzed the samples for free fatty acid profiles and provided the data, along with a portion of each sample, to the Technical Services Division (TSD) for analysis by NMR and oil extraction. Based on the data compiled from these samples, FGIS developed an adjustment table for NuSun seeds.

In addition to the research conducted for determining adjustment factors, FGIS analyzed 182 samples of various seed types on a table-top Abbe refractometer for the 3 different types of refractometer measurements (brix, temperature corrected brix, and refractive index). Based on the data collected from the testing, FGIS has determined that with the introduction of NuSun varieties, the refractive index method is no longer effective for distinguishing seed type.

3. ACTION

Applicants requesting sunflower seed oil determination must declare the seed type as part of the service. Based on the applicant's declaration of seed type, official personnel will perform NMR testing and apply, if applicable, the correct adjustment factor (from tables) to each sample to determine the true oil content.

4. CERTIFICATION STATEMENTS

If the NMR oil content being certified is from a mid-oleic or high-oleic type sunflower seed sample, one of the following statements must be included on the certificate.

For applicant declared sunflower seed type:

(Mid-oleic, High-oleic, as applicable) type sunflower seed, per applicant statement.

or

Applicant states sunflower seed is (high-oleic, mid-oleic, as applicable) type.

5. ADJUSTMENT TABLES

Citing the proprietary nature of high-oleic-type seed, FGIS will release a “custom figured” adjustment table only to the applicant and official testing location(s) providing NMR testing of the applicant’s specialty seed.

In 1998, FGIS published an adjustment table (see attachment) for mid-oleic-type seed (NuSun). FGIS will continue to work with the industry to monitor the effectiveness of the adjustment table as NuSun varieties are developed.

6. **FEES**

FGIS will assess fees to applicants (i.e., seed companies) requesting new or updated "custom figured" adjustment tables for proprietary high-oleic-type seeds produced in the United States. TSD will bill the applicable "Special Services" fee (code G258), as found in Table 3, "Miscellaneous Services", of the FGIS Official Inspection and Weighing Service Fee Schedule, to cover the analytical work and staff time required by the Analytical, Reference, and Testing Services Branch (ARTS) to develop the tables.

7. **FILING INSTRUCTIONS**

File a copy of this notice with the NMR Handbook. The handbook will be revised at a later date to include these changes.

8. **QUESTIONS**

Direct questions concerning adjustment factors to TSD at (816) 891-0464. Direct any questions relating to certification to the Standards and Procedures Branch at (202) 720-0224.

David Orr, Director
Field Management Division

Attachment

Attachment
FGIS-PN-99-19
10-18-99

Mid-Oleic (NuSun)
Adjustment Table

NMR %	x 0.97	True %
33.1	32.1	**32.3**
33.2	32.2	**32.4**
33.3	32.3	**32.4**
33.4	32.4	**32.5**
33.5	32.5	**32.6**
33.6	32.6	**32.7**
33.7	32.7	**32.8**
33.8	32.8	**32.9**
33.9	32.9	**33.0**
34.0	33.0	**33.1**
34.1	33.1	**33.2**
34.2	33.2	**33.3**
34.3	33.3	**33.4**
34.4	33.4	**33.5**
34.5	33.5	**33.6**
34.6	33.6	**33.7**
34.7	33.7	**33.8**
34.8	33.8	**33.9**
34.9	33.9	**34.0**
35.0	34.0	**34.1**
35.1	34.0	**34.2**
35.2	34.1	**34.3**
35.3	34.2	**34.4**
35.4	34.3	**34.5**
35.5	34.4	**34.5**
35.6	34.5	**34.6**
35.7	34.6	**34.7**
35.8	34.7	**34.8**
35.9	34.8	**34.9**
36.0	34.9	**35.0**
36.1	35.0	**35.1**
36.2	35.1	**35.2**
36.3	35.2	**35.3**
36.4	35.3	**35.4**
36.5	35.4	**35.5**
36.6	35.5	**35.6**
36.7	35.6	**35.7**
36.8	35.7	**35.8**
36.9	35.8	**35.9**
37.0	35.9	**36.0**

NMR %	x 0.97	True %
37.1	36.0	**36.1**
37.2	36.1	**36.2**
37.3	36.2	**36.3**
37.4	36.3	**36.4**
37.5	36.4	**36.5**
37.6	36.5	**36.5**
37.7	36.6	**36.6**
37.8	36.7	**36.7**
37.9	36.8	**36.8**
38.0	36.9	**36.9**
38.1	37.0	**37.0**
38.2	37.1	**37.1**
38.3	37.2	**37.2**
38.4	37.2	**37.3**
38.5	37.3	**37.4**
38.6	37.4	**37.5**
38.7	37.5	**37.6**
38.8	37.6	**37.7**
38.9	37.7	**37.8**
39.0	37.8	**37.9**
39.1	37.9	**38.0**
39.2	38.0	**38.1**
39.3	38.1	**38.2**
39.4	38.2	**38.3**
39.5	38.3	**38.4**
39.6	38.4	**38.5**
39.7	38.5	**38.5**
39.8	38.6	**38.6**
39.9	38.7	**38.7**
40.0	38.8	**38.8**
40.1	38.9	**38.9**
40.2	39.0	**39.0**
40.3	39.1	**39.1**
40.4	39.2	**39.2**
40.5	39.3	**39.3**
40.6	39.4	**39.4**
40.7	39.5	**39.5**
40.8	39.6	**39.6**
40.9	39.7	**39.7**
41.0	39.8	**39.8**

NMR %	x 0.97	True %
41.1	39.9	**39.9**
41.2	40.0	**40.0**
41.3	40.1	**40.1**
41.4	40.2	**40.2**
41.5	40.3	**40.3**
41.6	40.4	**40.4**
41.7	40.4	**40.5**
41.8	40.5	**40.6**
41.9	40.6	**40.6**
42.0	40.7	**40.7**
42.1	40.8	**40.8**
42.2	40.9	**40.9**
42.3	41.0	**41.0**
42.4	41.1	**41.1**
42.5	41.2	**41.2**
42.6	41.3	**41.3**
42.7	41.4	**41.4**
42.8	41.5	**41.5**
42.9	41.6	**41.6**
43.0	41.7	**41.7**
43.1	41.8	**41.8**
43.2	41.9	**41.9**
43.3	42.0	**42.0**
43.4	42.1	**42.1**
43.5	42.2	**42.2**
43.6	42.3	**42.3**
43.7	42.4	**42.4**
43.8	42.5	**42.5**
43.9	42.6	**42.6**
44.0	42.7	**42.6**
44.1	42.8	**42.7**
44.2	42.9	**42.8**
44.3	43.0	**42.9**
44.4	43.1	**43.0**
44.5	43.2	**43.1**
44.6	43.3	**43.2**
44.7	43.4	**43.3**
44.8	43.5	**43.4**
44.9	43.6	**43.5**
45.0	43.7	**43.6**

NMR %	x 0.97	True %
45.1	43.7	**43.7**
45.2	43.8	**43.8**
45.3	43.9	**43.9**
45.4	44.0	**44.0**
45.5	44.1	**44.1**
45.6	44.2	**44.2**
45.7	44.3	**44.3**
45.8	44.4	**44.4**
45.9	44.5	**44.5**
46.0	44.6	**44.6**
46.1	44.7	**44.6**
46.2	44.8	**44.7**
46.3	44.9	**44.8**
46.4	45.0	**44.9**
46.5	45.1	**45.0**
46.6	45.2	**45.1**
46.7	45.3	**45.2**
46.8	45.4	**45.3**
46.9	45.5	**45.4**
47.0	45.6	**45.5**
47.1	45.7	**45.6**
47.2	45.8	**45.7**
47.3	45.9	**45.8**
47.4	46.0	**45.9**
47.5	46.1	**46.0**
47.6	46.2	**46.1**
47.7	46.3	**46.2**
47.8	46.4	**46.3**
47.9	46.5	**46.4**
48.0	46.6	**46.5**
48.1	46.7	**46.6**
48.2	46.8	**46.6**
48.3	46.9	**46.7**
48.4	46.9	**46.8**
48.5	47.0	**46.9**
48.6	47.1	**47.0**
48.7	47.2	**47.1**
48.8	47.3	**47.2**
48.9	47.4	**47.3**
49.0	47.5	**47.4**

1. Find the % oil reported by the NMR in the left column or the interim NMR value in the center column.
2. The true oil content is shown in the right column.